

What is claimed is:

1. A semiconductor apparatus which protects a first-conductivity-type MOS output transistor against a surge entering through an output electrode connected to a drain of said first-conductivity-type MOS output transistor, said apparatus comprising:

a first-conductivity-type MOS protection transistor having a drain connected to the drain of said first-conductivity-type MOS output transistor, a source connected to a source of said first-conductivity-type MOS output transistor, and a gate connected to a second-conductivity-type layer under a gate of said first-conductivity-type MOS output transistor.

2. The semiconductor apparatus according to claim 1, wherein said first-conductivity-type MOS output transistor and said first-conductivity-type MOS protection transistor are of an SOI structure.

3. The semiconductor apparatus according to claim 2, comprising: a second-conductivity-type area connected to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor,

wherein the gate of said first-conductivity-type MOS protection transistor is connected via said second-conductivity-type area to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor.

4. The semiconductor apparatus according to claim 1, wherein the

gate of said first-conductivity-type MOS protection transistor is connected by an electrode wiring to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor.

5

5. The semiconductor apparatus according to claim 1, wherein the drain of said first-conductivity-type MOS protection transistor is formed closer to the output electrode than the drain of said first-conductivity-type MOS output transistor.

10

6. The semiconductor apparatus according to claim 1, wherein said first-conductivity-type MOS protection transistor is higher in electrostatic destruction withstand voltage than said first-conductivity-type MOS output transistor.

15

7. The semiconductor apparatus according to claim 6, wherein said first-conductivity-type MOS output transistor and said first-conductivity-type MOS protection transistor are of an SOI structure.

20

8. The semiconductor apparatus according to claim 7, comprising:  
a second-conductivity-type area connected to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor,

25

wherein the gate of said first-conductivity-type MOS protection transistor is connected via said second-conductivity-type area to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor.

9. The semiconductor apparatus according to claim 6, wherein the gate of said first-conductivity-type MOS protection transistor is connected by an electrode wiring to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor.

10. The semiconductor apparatus according to claim 6, wherein the drain of said first-conductivity-type MOS protection transistor is formed closer to the output electrode than the drain of said first-conductivity-type MOS output transistor.

11. The semiconductor apparatus according to claim 10, wherein said first-conductivity-type MOS output transistor and said first-conductivity-type MOS protection transistor are of an SOI structure.

12. The semiconductor apparatus according to claim 11, comprising:  
a second-conductivity-type area connected to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor,

wherein the gate of said first-conductivity-type MOS protection transistor is connected via said second-conductivity-type area to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor.

13. The semiconductor apparatus according to claim 10, wherein the gate of said first-conductivity-type MOS protection transistor is

connected by an electrode wiring to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor.

5 14. The semiconductor apparatus according to claim 13, wherein said first-conductivity-type MOS output transistor and said first-conductivity-type MOS protection transistor are of an SOI structure.

15. The semiconductor apparatus according to claim 14,  
10 comprising:  
a second-conductivity-type area connected to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor,  
wherein the gate of said first-conductivity-type MOS protection  
15 transistor is connected via said second-conductivity-type area to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor.

16. A semiconductor apparatus which protects a first-conductivity-  
20 type MOS output transistor and a second-conductivity-type MOS output transistor against a surge entering through an output electrode connected to each of drains of said first-conductivity-type MOS output transistor whose source is connected to ground and said second-conductivity-type MOS output transistor whose source is connected to  
25 a power supply, said apparatus comprising:

a first-conductivity-type MOS protection transistor having a drain connected to the drain of said first-conductivity-type MOS

output transistor, a source connected to a source of said first-conductivity-type MOS output transistor, and a gate connected to a second-conductivity-type layer under a gate of said first-conductivity-type MOS output transistor; and

5           a second-conductivity-type MOS protection transistor having a drain connected to the drain of said second-conductivity-type MOS output transistor, a source connected to a source of said second-conductivity-type MOS output transistor, and a gate connected to a first-conductivity-type layer under a gate of said second-conductivity-  
10   type MOS output transistor.

17.    The semiconductor apparatus according to claim 16, wherein said first-conductivity-type MOS output transistor, said first-conductivity-type MOS protection transistor, said second-conductivity-  
15   type MOS output transistor, and said second-conductivity-type MOS protection transistor are of an SOI structure.

18.    The semiconductor apparatus according to claim 17, comprising:

20           a second-conductivity-type area connected to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor; and

          a first-conductivity-type area connected to said first-conductivity-type layer under the gate of said second-conductivity-type  
25   MOS output transistor,

          wherein the gate of said first-conductivity-type MOS protection transistor is connected via said second-conductivity-type area to said

second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor, and

wherein the gate of said second-conductivity-type MOS protection transistor is connected via said first-conductivity-type area to said first-conductivity-type layer under the gate of said second-conductivity-type MOS output transistor.

19. The semiconductor apparatus according to claim 16, wherein the gates of said first-conductivity-type MOS protection transistor and said second-conductivity-type MOS protection transistor are connected by electrode wirings respectively to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor and to said first-conductivity-type layer under the gate of said second-conductivity-type MOS output transistor.

15

20. The semiconductor apparatus according to claim 16, wherein the drains of said first-conductivity-type MOS protection transistor and said second-conductivity-type MOS protection transistor are formed closer to the output electrode than the drains of said first-conductivity-type MOS output transistor and said second-conductivity-type MOS output transistor.

21. The semiconductor apparatus according to claim 16, wherein said first-conductivity-type MOS protection transistor and said second-conductivity-type MOS protection transistor are higher in electrostatic destruction withstand voltage than said first-conductivity-type MOS output transistor and said second-conductivity-

type MOS output transistor.

22. The semiconductor apparatus according to claim 21, wherein  
said first-conductivity-type MOS output transistor, said first-  
5 conductivity-type MOS protection transistor, said second-conductivity-  
type MOS output transistor, and said second-conductivity-type MOS  
protection transistor are of an SOI structure.

23. The semiconductor apparatus according to claim 22,  
10 comprising:

a second-conductivity-type area connected to said second-  
conductivity-type layer under the gate of said first-conductivity-type  
MOS output transistor; and

a first-conductivity-type area connected to said first-  
15 conductivity-type layer under the gate of said second-conductivity-type  
MOS output transistor,

wherein the gate of said first-conductivity-type MOS protection  
transistor is connected via said second-conductivity-type area to said  
second-conductivity-type layer under the gate of said first-  
20 conductivity-type MOS output transistor, and

wherein the gate of said second-conductivity-type MOS  
protection transistor is connected via said first-conductivity-type area  
to said first-conductivity-type layer under the gate of said second-  
conductivity-type MOS output transistor.

25

24. The semiconductor apparatus according to claim 21, wherein  
the gates of said first-conductivity-type MOS protection transistor and

said second-conductivity-type MOS protection transistor are connected by electrode wirings respectively to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor and to said first-conductivity-type layer under the gate of  
5 said second-conductivity-type MOS output transistor.

25. The semiconductor apparatus according to claim 21, wherein the drains of said first-conductivity-type MOS protection transistor and said second-conductivity-type MOS protection transistor are  
10 formed closer to the output electrode than the drains of said first-conductivity-type MOS output transistor and said second-conductivity-type MOS output transistor.

26. The semiconductor apparatus according to claim 25, wherein said  
15 first-conductivity-type MOS output transistor, said first-conductivity-type MOS protection transistor, said second-conductivity-type MOS output transistor, and said second-conductivity-type MOS protection transistor are of an SOI structure.

20 27. The semiconductor apparatus according to claim 26, comprising:

a second-conductivity-type area connected to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor; and

25 a first-conductivity-type area connected to said first-conductivity-type layer under the gate of said second-conductivity-type MOS output transistor,



wherein the gate of said first-conductivity-type MOS protection transistor is connected via said second-conductivity-type area to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor, and

5            wherein the gate of said second-conductivity-type MOS protection transistor is connected via said first-conductivity-type area to said first-conductivity-type layer under the gate of said second-conductivity-type MOS output transistor.

10    28.    The semiconductor apparatus according to claim 25, wherein the gates of said first-conductivity-type MOS protection transistor and said second-conductivity-type MOS protection transistor are connected by electrode wirings respectively to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor and to said first-conductivity-type layer under the gate of  
15    said second-conductivity-type MOS output transistor.

29.    The semiconductor apparatus according to claim 28, wherein said first-conductivity-type MOS output transistor, said first-conductivity-type MOS protection transistor, said second-conductivity-type MOS output transistor, and said second-conductivity-type MOS protection transistor are of an SOI structure.

30.    The semiconductor apparatus according to claim 29,  
25    comprising:

          a second-conductivity-type area connected to said second-conductivity-type layer under the gate of said first-conductivity-type

MOS output transistor; and

a first-conductivity-type area connected to said first-conductivity-type layer under the gate of said second-conductivity-type MOS output transistor,

5 wherein the gate of said first-conductivity-type MOS protection transistor is connected via said second-conductivity-type area to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor, and

10 wherein the gate of said second-conductivity-type MOS protection transistor is connected via said first-conductivity-type area to said first-conductivity-type layer under the gate of said second-conductivity-type MOS output transistor.

15